April 2012

Type 1190 Low-Pressure Gas Blanketing Regulator

WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion, fire and/or chemical contamination causing property damage and personal injury or death.

Fisher® regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc. (Regulator Technologies) instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation, and maintenance procedures performed by unqualified personnel may result in improperadjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Use qualified personnel when installing, operating, and maintaining the Type 1190 regulator.

Figure 1. *Type 1190 Low-Pressure Gas Blanketing Regulator*

Introduction

Scope of the Manual

This manual provides installation, startup, and maintenance instructions and parts ordering information for the Type 1190 low-pressure gas blanketing regulator (Figure 1) complete with Type Y191A pilot and Type 95H supply pressure regulator.

Product Description

The Type 1190 low-pressure gas blanketing regulator is a pilot-operated, pressure reducing regulator with a supply pressure regulator. This regulator is used for extremely accurate pressure control on very low-pressure gas blanketing systems. This regulator helps to control emissions and provides protection against any contamination from atmospheric conditions by providing a flushing action.

The Type 1190 gas blanketing regulator maintains a positive vessel pressure thereby reducing the possibility of vessel wall collapse during pump-out operations.

D101644X012

Specifications

Specifications for a given regulator as it originally comes from the factory are stamped on nameplates located on the actuator and main valve body, while the pilot outlet pressure range appears on the pilot spring case closing cap.

Body Sizes[1]

BODY SIZES,		END CONNECTION STYLE	
NPS	DN	Cast Iron	WCC Steel or CF8M Stainless Steel
1, 2	25, 50	NPT, CL125 FF, or CL250 RF flanged	NPT, SWE, BWE, CL150 RF, CL300 RF, CL600 RF, or PN 16 / 25 / 40 flanged
3, 4, 6	80, 100, 150	CL125 FF, or CL250 RF flanged	BWE, CL150 RF, CL300 RF, CL600 RF, or PN 16 flanged
8 x 6, 12 x 6	200 x 150, 300 x 150	- - - -	BWE, CL150 RF, CL300 RF, CL600 RF, or PN 25 flanged

Maximum Main Valve Inlet Pressures[2]

400 psig / 27.6 bar

Maximum Operating Inlet Pressures[2]

200 psig / 13.8 bar with cast iron construction or 300 psig / 20.7 bar with a steel or stainless steel construction

Maximum Outlet (Casing) Pressure[2]

75 psig / 5.2 bar

Maximum Operating Outlet Pressure to Avoid Internal Parts Damage[2]

75 psig / 5.2 bar

Outlet Pressure Ranges (Type Y191A Pilot)[2]

See Table 1

Flow Coefficients for Relief Valve Sizing

See Table 2

Maximum and Minimum Differential Pressures

See Table 3

Main Valve Orifice Diameters and Travels

BODY SIZES		ORIFICE DIAMETER		TRAVEL				
				Standard		Restricted Capacity		
						Percent	Travel	
NPS	DN	Inch	mm	Inch	mm		Inch	mm
1	25	1-5/16	33	3/4	19	- - - -	- - - -	- - - -
2	50	2-3/8	60	1-1/8	29	30	3/8	95
						70	5/8	16
3	80	3-3/8	86	1-1/2	38	40	7/8	22
4	100	4-3/8	111	2	51	40	1	25
6, 8 x 6, 12 x 6	150, 200 x 150, 300 x 150	7-3/16	183	2	51	40	1	25

Supply Pressure Settings Required for the Type 95H Supply Pressure Regulator

See Table 4

Pressure Registration

External

Main Valve Flow Characteristic

Linear

Temperature Capabilities[2]

Nitrile (NBR): -20 to 180°F / -29 to 82°C
Fluorocarbon (FKM): 40 to 300°F / 4 to 149°C
Ethylenepropylene (EPDM): -20 to 275°F / -29 to 135°C
Perfluoroelastomer (FFKM): -20 to 300°F / -29 to 149°C

Approximate Weights

NPS 1 / DN 25: 85 pounds / 39 kg
NPS 2 / DN 50: 100 pounds / 45 kg
NPS 3 / DN 80: 145 pounds / 66 kg
NPS 4 / DN 100: 195 pounds / 88 kg
NPS 6 / DN 150: 380 pounds / 172 kg
NPS 8 x 6 / DN 200 x 150: 740 pounds / 336 kg
NPS 12 x 6 / DN 300 x 150: 1265 pounds / 574 kg

1. End connections for other than U.S. standard can usually be provided; consult your local Sales Office.
2. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

Table 1. *Outlet Pressure Ranges (Type Y191A Pilot)*

OUTLET PRESSURE RANGE[1]		SPRING PART NUMBER	SPRING COLOR	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
Inches w.c.	mbar			Inch	mm	Inch	mm
0.25 to 2.5[2]	0.6 to 6[2]	1B558527052	Orange	0.072	1.83	3.78	96.0
2 to 7[2]	5 to 17[2]	1B653827052	Red	0.085	2.16	3.63	92.1
5 to 16	12 to 40	1B653927022	Unpainted	0.105	2.67	3.75	95.3
0.5 to 1.2 psig	34 to 83	1B537027052	Yellow	0.114	2.90	4.19	106
1.1 to 2.5 psig	76 to 172	1B537127022	Green	0.156	3.96	4.06	103
2.5 to 4.5 psig	172 mbar to 0.31 bar	1B537227022	Light blue	0.187	4.75	3.94	100
4.5 to 7.0 psig	0.31 to 0.48 bar	1B537327052	Black	0.218	5.54	3.98	101

1. Outlet pressure ranges based on pilot being installed with the spring case pointed down.
2. Do not use Fluorocarbon (FKM) diaphragm with this spring at diaphragm temperatures lower than 60°F / 16°C.

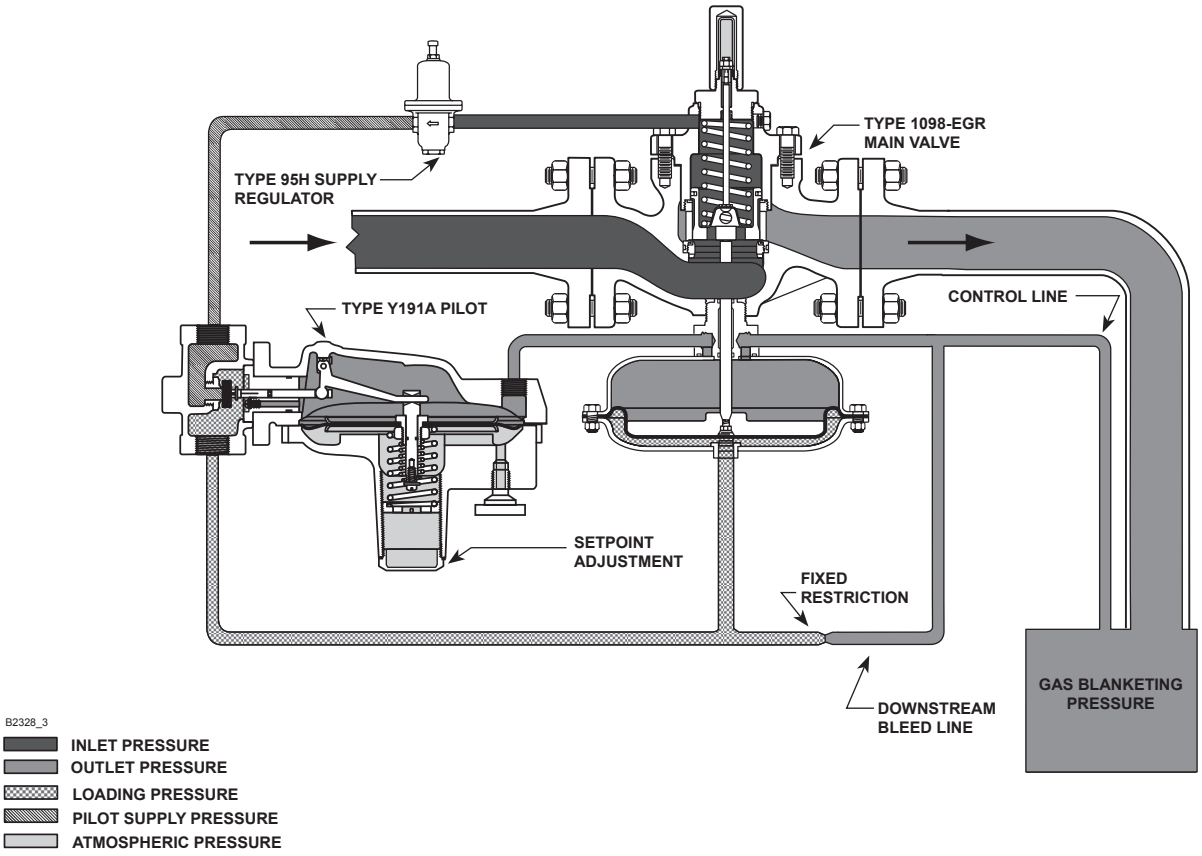

Figure 2. *Type 1190 Low-Pressure Gas Blanketing Regulator Operational Schematic*

Principle of Operation

The Type 1190 gas blanketing regulator reduces a high-pressure inert gas to maintain a positive low-pressure gas blanket over a stored liquid while liquid is being pumped out of the tank. Also, when the tank suddenly cools causing tank vapors to condense, the Type 1190 regulator replaces the condensing vapors with an inert gas to prevent the internal tank pressure from decreasing. In both cases, a positive tank pressure prevents outside air from entering the vessel preventing contamination and reducing the possibility of atmospheric pressure collapsing the vessel.

The Type 1190 regulator is pilot-operated to respond to slight decreases in internal tank pressure by throttling open to increase the flow rate of inert gas into the vessel. When the vessel's liquid level has been lowered to the desired point and the vapor pressure re-established, the Type 1190 regulator throttles closed.

The Type 1190 regulator utilizes a Type 1098-EGR main valve actuator (Type EGR main valve and Type 1098 actuator), a Type Y191A sensing pilot, and a Type 95H supply pressure regulator. The Type Y191A pilot uses the high-pressure inlet gas, reduced by the Type 95H supply pressure regulator, as loading pressure to operate the Type 1098-EGR main valve actuator. The outlet or vessel pressure is sensed through a control line on the Type 1098-EGR main valve actuator and also on the Type Y191A pilot diaphragm.

When the liquid level is decreased and vessel pressure decreases below the pilot outlet pressure setting, the spring force on the pilot diaphragm opens the pilot valve plug, allowing additional loading pressure on the main valve actuator diaphragm. The loading pressure opens the main valve plug to supply the required flow of gas to the vessel.

When downstream demand has been satisfied, outlet pressure tends to increase slightly, acting on the pilot and main valve diaphragms. When the outlet pressure exceeds the pilot outlet pressure setting, the pilot diaphragm moves to close the pilot valve plug. The loading pressure reduces by exhausting downstream through the fixed restriction, allowing the main valve spring to close the main valve plug. The combination of main valve spring force and main valve plug unbalance provides positive shutoff of the valve plug.

Table 2. *Flow Coefficients*

BODY SIZES		PIPING STYLE									
		Line Size Equals Body Size Piping									
		Linear Cage					Drilled Hole Whisper Trim™ Cage				
		C_g		C_v		C_1	C_g		C_v		C_1
NPS	DN	Regulating	Wide-Open	Regulating	Wide-Open		Regulating	Wide-Open	Regulating	Wide-Open	
1	25	600	632	16.8	17.7	35.7	576	607	16.7	17.6	34.5
2	50	2280	2400	63.3	66.7	36.0	1970	2080	54.7	57.8	36.0
3	80	4630	4880	132	139	35.1	3760	3960	107	113	35.0
4	100	7320	7710	202	213	36.2	6280	6610	180	190	34.8
6	150	12,900	13,600	397	418	32.5	9450	9950	295	310	32.0
8 x 6	200 x 150	18,480	19,450	578	608	32.0	10,660	11,220	305	321	35.0
12 x 6	300 x 150	21,180	22,290	662	697	32.0	11,050	11,630	316	332	35.0
BODY SIZES		2:1 Line Size to Body Size Piping									
		Standard Linear Cage					Drilled Hole Whisper Trim™ Cage				
		C_g		C_v		C_1	C_g		C_v		C_1
NPS	DN	Regulating	Wide-Open	Regulating	Wide-Open		Regulating	Wide-Open	Regulating	Wide-Open	
1	25	568	598	17.2	18.1	33.0	529	557	15.6	16.4	34.0
2	50	2050	2160	59.6	62.8	34.4	1830	1930	52.3	55.1	35.0
3	80	4410	4650	128	135	34.4	3630	3830	106	110	34.2
4	100	6940	7310	198	209	35.0	6020	6340	171	180	35.2
6	150	12,100	12,800	381	404	31.7	9240	9730	291	306	31.7
8 x 6	200 x 150	17,370	18,280	543	571	32.0	10,020	10,550	286	301	35.0
12 x 6	300 x 150	19,900	20,950	622	655	32.0	10,380	10,930	297	312	35.0

Table 3. *Maximum and Minimum Differential Pressures for Main Valve Spring Selection*

BODY SIZES		MAIN VALVE SPRING PART NUMBER	SPRING COLOR	MAXIMUM ALLOWABLE DIFFERENTIAL PRESSURE		MINIMUM DIFFERENTIAL PRESSURE REQUIRED FOR FULL STROKE	
NPS	DN			psig	bar	psig	bar
1	25	14A9687X012	Green	60	4.1	2.5	0.17
		14A9680X012	Blue	125	8.6	4	0.28
		14A9679X012	Red	300 or body rating limit, whichever is lower	20.7 or body rating limit, whichever is lower	5	0.34
2	50	14A6626X012	Green	60	4.1	3	0.21
		14A6627X012	Blue	125	8.6	5	0.34
		14A6628X012	Red	300 or body rating limit, whichever is lower	20.7 or body rating limit, whichever is lower	10	0.69
3	80	14A6629X012	Green	60	4.1	4	0.28
		14A6630X012	Blue	125	8.6	6	0.41
		14A6631X012	Red	300 or body rating limit, whichever is lower	20.7 or body rating limit, whichever is lower	11	0.76
4	100	14A6632X012	Green	60	4.1	5	0.34
		14A6633X012	Blue	125	8.6	8	0.55
		14A6634X012	Red	300 or body rating limit, whichever is lower	20.7 or body rating limit, whichever is lower	13	0.90
6, 8 x 6, 12 x 6	150, 200 x 150, 300 x 150	14A9686X012	Green	60	4.1	9.5	0.66
		14A9685X012	Blue	125	8.6	14	1.0
		15A2615X012	Red	300 or body rating limit, whichever is lower	20.7 or body rating limit, whichever is lower	19	1.3

Table 4. *Supply Pressure Settings Required for the Type 95H Regulator*

BODY SIZES		TYPE EGR SPRING COLOR	SUPPLY PRESSURE													
			Type Y191A Spring Color													
			Orange		Red		Unpainted		Yellow		Green		Light Blue		Black	
NPS	DN		psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
1	25	Green	6	0.41	6	0.41	6	0.41	7	0.48	8	0.55	11	0.76	13	0.90
		Blue	7	0.48	7	0.48	7	0.48	8	0.55	10	0.69	13	0.90	14	1.0
		Red	8	0.55	8	0.55	8	0.55	9	0.62	11	0.76	14	0.97	15	1.0
2	50	Green	6	0.41	6	0.41	6	0.41	7	0.48	9	0.62	12	0.83	13	0.90
		Blue	8	0.55	8	0.55	8	0.55	9	0.62	11	0.76	14	0.97	15	1.0
		Red	13	0.90	13	0.90	13	0.90	14	1.0	16	1.1	19	1.3	20	1.4
3	80	Green	7	0.48	7	0.48	7	0.48	8	0.55	10	0.69	13	0.90	14	1.0
		Blue	9	0.62	9	0.62	9	0.62	10	0.69	12	0.83	15	1.0	16	1.1
		Red	14	1.0	14	1.0	14	1.0	15	1.0	17	1.2	20	1.4	21	1.5
4	100	Green	8	0.55	8	0.55	8	0.55	9	0.62	11	0.76	14	1.0	15	1.0
		Blue	11	0.76	11	0.76	11	0.76	12	0.83	14	1.0	17	1.2	18	1.3
		Red	16	1.1	16	1.1	16	1.1	17	1.2	19	1.3	22	1.5	23	1.6
6, 8 x 6, 12 x 6	150, 200 x 150, 300 x 150	Green	13	0.90	13	0.90	13	0.90	14	1.0	15	1.0	18	1.2	20	1.4
		Blue	17	1.2	17	1.2	17	1.2	18	1.2	20	1.4	23	1.6	24	1.7
		Red	22	1.5	22	1.5	22	1.5	23	1.6	25	1.7	28	1.9	29	2.0

1. The pressures shown in the table are the minimum supply pressures required by the pilot. If the inlet pressure is less than shown, an external pilot supply is necessary.

Installation and Startup

WARNING

Personal injury, equipment damage, or leakage due to escaping accumulated gas or bursting of pressure-containing parts may result if this gas blanketing regulator is overpressured or is installed where service conditions could exceed the limits given in the Specifications section and on the appropriate nameplate, or where conditions exceed any ratings of the adjacent piping or piping connections.

To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by Title 49, Part 192, of the U.S. Code of Federal Regulations; by the National Fuel Gas Code Title 54 of the National Fire Codes of the National Fire Protection Association; or by other applicable codes) to prevent service conditions from exceeding those limits.

Additionally, physical damage to the gas blanketing regulator could result in personal injury and property damage due to escaping accumulated gas. To avoid such injury and damage, install the gas blanketing regulator in a safe location.

Note

On the Type EGR main valve, a normal pressure drop assists shutoff. Therefore, leakage (backflow) may result during any reverse pressure drop condition.

1. Use qualified personnel when installing, operating, and maintaining regulators. Before installing, inspect the main valve, actuator, pilot, supply pressure regulator, and tubing for any shipment damage or foreign material that may have collected during crating and shipment. Make certain the body interior is clean and the pipelines are free of foreign material. Apply pipe compound only to the external pipe threads with a threaded body, or use suitable line gaskets and good bolting practices with a flanged body.

Note

The Type 1190 gas blanketing regulator should be installed as shown in Figure 1 so that flow through the Type 1098-EGR main valve actuator matches the flow arrow attached to the valve body.

WARNING

A regulator may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas

may accumulate, and cause personal injury, death, or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous location. The vent line or stack opening must be protected against condensation or clogging.

2. To keep the pilot spring case vent assembly from plugging or the spring case from collecting moisture, corrosive chemicals, or other foreign material, point the vent down or otherwise protect it. For proper operation, install the Type Y191A pilot with the spring case barrel pointed down as shown in Figure 1. To remotely vent a Type Y191A, remove the vent assembly (key 26, Figure 8) and install obstruction-free tubing or piping into the 1/4 NPT vent tapping. Provide protection on a remote vent by installing a screened vent cap into the end of the vent pipe.
3. Attach a 3/4 NPT downstream pressure control line to the tank using a straight run of pipe. Connect the other end of the control line to the Type 1098 actuator bonnet connection (see Figure 2).

Prestartup Considerations

Before beginning the startup procedure in this section, make sure the following conditions are in effect:

- Block valves isolate the regulator
- Hand valves are closed
- Gauges may be installed (if required) in place of pipe plugs (key 52, Figure 10)

Note

For proper operation, the Type 95H is factory set to the values in Table 4.

Slowly open the upstream block valve introducing pressure into the Type 1190 gas blanketing regulator. Slowly open the downstream block valve. The regulator will immediately begin to operate. Monitor the blanket pressure to ensure correct operation.

Note

The Type 1190 regulator was preset at the factory at the customer's specified pressure or the mid-range of the Type Y191A pilot. The outlet pressure range of the Type Y191A pilot is stamped on the spring case closing cap.

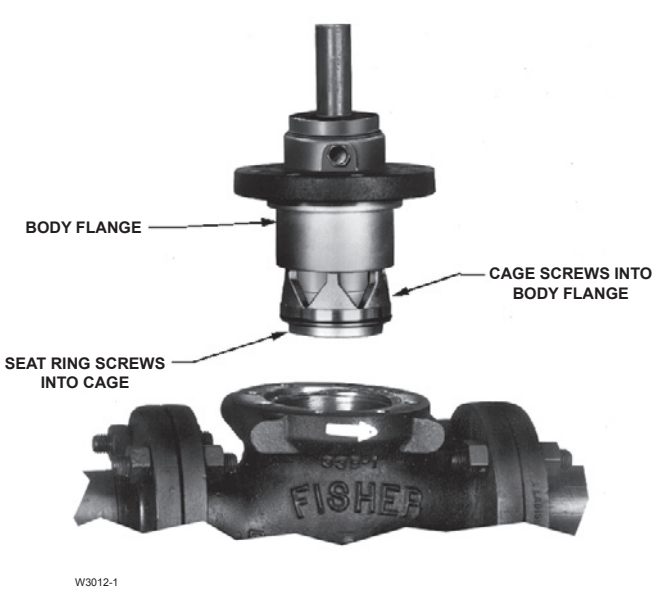

Figure 3. *Trim Package Removal*

The only adjustment necessary on a Type 1190 regulator is the pilot control spring pressure setpoint. Turning the adjusting screw of the Type Y191A pilot clockwise into the spring case increases the spring compression and pressure setting. Turning the adjusting screw counterclockwise decreases the spring compression and pressure setting.

Shutdown

Installation arrangements vary, but in any installation it is important to open and close valves slowly and to close the upstream block valve first when shutting down the system.

Maintenance

Regulator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends upon the severity of the service conditions or the requirements of local, state, and federal regulations. Due to the care Regulator Technologies takes in meeting all manufacturing requirements (heat treating, dimensional tolerances, etc.), use only replacement parts manufactured or furnished by Regulator Technologies.

The stem O-rings on the Type 1098 actuator can be lubricated annually, using the grease fitting (key 28, Figure 7). Line pressure leakage or unexpected grease extrusion from the actuator vent (key 27, Figure 7)

during normal operation indicates stem O-ring damage. All O-rings, gaskets, and seals should be lubricated with a good grade of general-purpose grease and installed gently rather than forced into position. Be certain that the nameplates are updated to accurately indicate any field changes in equipment, materials, service conditions, or pressure settings.

WARNING

To avoid personal injury resulting from sudden release of pressure, isolate the pilot or regulator from all pressure and cautiously release trapped pressure from the pilot or regulator before attempting disassembly.

Type EGR Main Valve

Replacing Quick-Change Trim Package

Perform this procedure if replacing the entire trim package (Figure 3). Key numbers for both the complete main valve and its trim package are referenced in Figure 6.

Note

All disassembly, trim change, and reassembly steps in this section can be performed with the Type EGR main valve in the pipeline.

1. Disconnect the supply pressure tubing from the top of the Type 1098-EGR main valve actuator. Remove the cap screws or stud bolts (key 3). Pry the body flange (key 2) loose from the valve body (key 1), and lift out the trim package (Figure 3).
2. Perform any required inspection, cleaning, or maintenance on the exposed surfaces of the valve body or trim package. Replace the gasket (key 4) and cage O-ring (key 17) as necessary.
3. On a pre-built replacement trim package, check indicator zeroing by unscrewing the indicator protector (key 19) and seeing if the flange of the flange nut (key 22) lines up evenly with the bottom marking on the indicator scale (key 18). If not, remove the indicator scale and separate the flange nut and hex nut (key 8). Hold the indicator scale against the indicator fitting (key 5) with the scale base resting against the shoulder of the fitting, and turn the indicator nut to align its flange with the bottom scale marking. Then lock both nuts against each other, and install the indicator scale and protector.

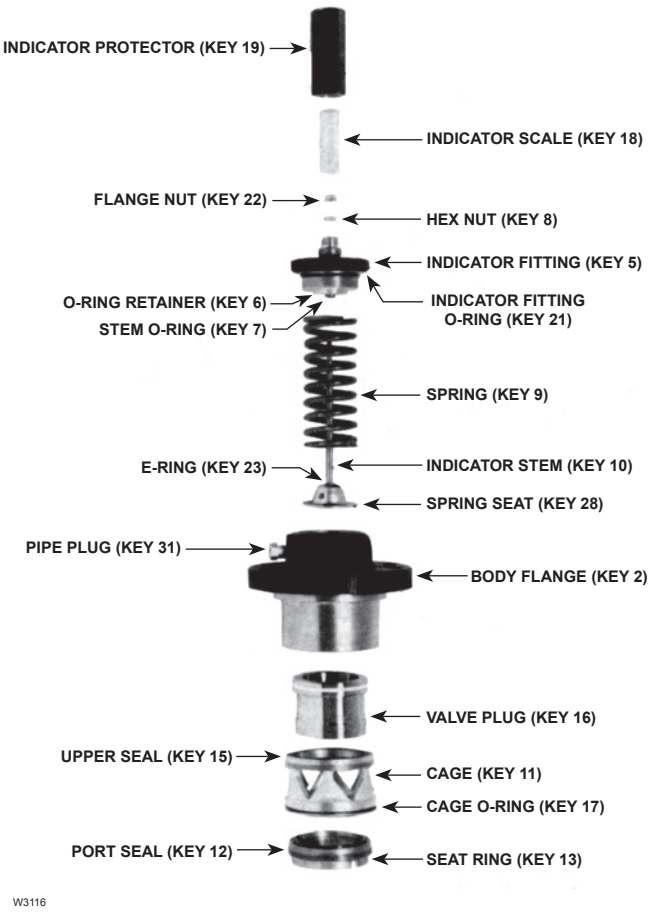

Figure 4. *Exploded View of Full-Capacity Trim Package Assembly*

4. Lightly coat the cage seating surfaces of the valve body web and the body flange seating surfaces of the valve body neck with a good grade of general purpose grease. Install the trim package, and secure it evenly with the cap screws or stud bolts. No particular trim package orientation in the body is required.
5. Remove the pipe plug (key 31) from the Type EGR main valve body flange (key 2) and reconnect the Type 95H supply pressure tubing and fittings as shown in Figure 10.

Replacing Trim Parts

Perform this procedure if inspecting, cleaning, or replacing individual parts in a trim package. Key numbers are referenced in Figure 6. An exploded view of a standard full-capacity trim package only is shown in Figure 4.

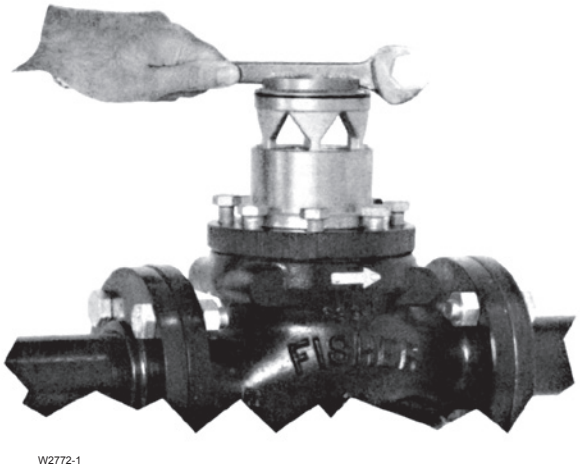

Figure 5. *Seat Ring/Cage Removal or Installation Using Body as Holding Fixture*

Note

Access to the spring (key 9), indicator fitting O-ring (key 21) or travel indicator parts in step 1 can be gained without removing the body flange (key 2).

1. Remove the indicator fitting (key 5) and attached parts. Disconnect the supply pressure tubing and fittings from the top of the Type 1098-EGR main valve. Proceed to step 5 if only performing maintenance on the fitting or attached parts.
2. Remove the cap screws or stud bolts (key 3) and pry the body flange (key 2) loose from the valve body (key 1).
3. Use the valve body as a holding fixture if desired. Flip the body flange over, and anchor it on the valve body as shown in Figure 5.
4. To gain access to the port seal (key 12), upper seal (key 15), or valve plug parts, unscrew the seat ring (key 13) from the cage (key 11) and the cage from the body flange (key 2). For leverage, insert a wrench handle or similar tool into the seat ring slots (Figure 5) and wrap a strap wrench around a cage, or insert a soft bar through the windows of the cage. Proceed to step 6 if no further maintenance is necessary.
5. To replace the body flange (key 2) or gain access to the spring (key 9), indicator stem (key 10), stem O-ring (key 7), spring seat (key 28), or E-ring (key 23), remove the indicator protector (key 19) and indicator scale (key 18). Since some compression is left in the spring, carefully remove the flange nut (key 22) and hex nut (key 8). Insert a screwdriver through the O-ring retainer (key 6) to remove the stem O-ring without removing the retainer. If necessary, unclip the E-ring from the indicator stem.
6. Replace and lubricate parts, such as the gasket (key 4) and cage O-ring (key 17), as necessary. If the port seal (key 12) and upper seal (key 15) were removed, install them in their retaining slots with the grooved sides facing out. Also for ease of installation, lubricate any other surfaces as necessary. No further main valve maintenance is necessary if only the indicator fitting and attached parts were removed.
7. Insert the valve plug (key 16) into the body flange (key 2), install the cage (key 11) plus upper seal (key 15), and O-ring (key 17) into the body flange, and then install the seat ring (key 13) plus port seal (key 12) into the cage. Use the valve body as a holding fixture during this step as shown in Figure 5, and insert a wrench handle or similar tool into the seat ring slots for leverage when tightening the seat ring (key 13) and cage.
8. Remove the upsidedown body flange (key 2) if it was anchored on the body (key 1). Lightly coat the cage seating surfaces of the valve body web and the body flange seating surfaces of the valve body neck with a good grade of general-purpose grease. Install the body flange on the body, and secure it evenly with the cap screws or stud bolts (key 3).
9. Install the indicator fitting O-ring (key 21), stem O-ring (key 7), and O-ring retainer (key 6) in the indicator fitting (key 5). Orient the spring seat (key 28) as shown in Figure 6, and attach it with the E-ring (key 23) to the slotted end of the indicator stem (key 10). Then install the spring (key 9).
10. Being careful not to cut the stem O-ring (key 7) with the stem threads, place the indicator fitting (key 5) over the indicator stem (key 10) until resting on the spring (key 9). Install the hex nut (key 8) and then the flanged indicator nut (key 22) on the indicator stem, pushing on the fitting if necessary to provide sufficient stem thread exposure. To maintain clearance for indicator part installation, draw up the spring seat (key 28) by turning the hex nut down on the stem until the threads bottom.
11. Install the indicator fitting (key 5) with attached parts into the body flange (key 2). Back off the hex nut (key 8) until the spring (key 9) completely closes the valve plug (key 16) against the port seal (key 12) and upper seal (key 15), as indicated by stem threads showing between this nut and the fitting.

12. Hold the indicator scale (key 18) against the fitting with the scale base resting against the shoulder of the fitting, and turn the flanged indicator nut (key 22) until its flange is aligned with the bottom scale marking. Then lock both nuts against each other, and install the indicator scale and protector (key 19).

Type Y191A Pilot

Key numbers are referenced in Figure 8.

WARNING

To avoid personal injury resulting from sudden release of pressure, isolate the pilot from all pressure and cautiously release trapped pressure from the pilot or regulator before attempting disassembly.

Body Area

This procedure is for gaining access to the disk assembly, orifice, and body seal O-ring.

1. Remove the cap screws (key 2) and separate the lower casing assembly (key 4) from the body (key 1).
2. Remove and inspect the body seal O-ring (key 11) and the backup ring (key 49). See the expanded view of the body area in Figure 8.
3. Inspect and replace the orifice (key 5) if necessary. Protect the orifice seating surface during disassembly and assembly. Sparingly lubricate the threads of the orifice with a good grade of grease and install with 29 to 38 foot-pounds / 39 to 51 N•m of torque.
4. To replace the disk assembly (key 13) or the throat seal O-ring (key 31), remove the cotter pin (key 15).
5. To inspect the throat seal O-ring (key 31), remove the machine screw (key 33). Replace if necessary and reassemble.
6. Install the disk assembly (key 13) and secure it with the cotter pin (key 15).
7. Place the backup ring (key 49) into the body (key 1). Then place the body seal O-ring (key 11) into the body.
8. Place the lower casing assembly (key 4) on the body (key 1) and secure it with the cap screws (key 2).

Diaphragm and Spring Case Area

This procedure is for gaining access to the spring, diaphragm, lever assembly, and stem.

To Change the Control Spring:

1. Remove the closing cap (key 22), and release all the compression from the spring (key 6) by turning the adjusting screw (key 35) counterclockwise.
2. Change the spring (key 6) to match the desired outlet pressure range.
3. Replace the adjusting screw (key 35).
4. Install a replacement closing cap gasket (key 25), if necessary, and reinstall the closing cap (key 22).
5. If the outlet pressure range was changed, be sure to change the stamped range on the nameplate.

To Disassemble and Reassemble Diaphragm Parts:

1. Remove the closing cap (key 22), and turn the adjusting screw (key 35) counterclockwise to remove the adjusting screw and the spring (key 6).
2. Remove the spring case hex nuts (key 23, not shown), cap screws (key 24), and spring case assembly (key 3).
3. Remove the diaphragm (key 10) and attached parts by tilting them so that the pusher post (key 8) slips off the lever assembly (key 16). To separate the diaphragm from the attached parts, unscrew the machine screw (key 38) from the pusher post.
4. Inspect the pusher post (key 8) and the connector seal O-ring (key 50), replace if required.
5. Remove hex nut (key 21) to separate the diaphragm (key 10) and attached parts.
6. To replace the lever assembly (key 16), remove the machine screws (key 17). To replace the stem (key 14), perform Body Area Maintenance steps 1 and 4, and pull the stem out of the guide insert (key 18).
7. Install the stem (key 14) into the guide insert (key 18) and then perform Body Area Maintenance steps 6 through 8 as necessary.
8. Install the lever assembly (key 16) into the stem (key 14) and secure the lever assembly with the machine screws (key 17).

9. Install the parts on the pusher post in the order listed below:
   - Pusher post (key 8)
   - Pusher post connector (key 40)
   - Connector seal O-ring (key 50)
   - Lower diaphragm head (key 51)
   - Diaphragm (key 10)
   - Diaphragm head (key 7)
   - Hex nut (key 21)—Torque hex nut to 9 to 11 foot-pounds / 12 to 15 N•m to secure parts to the pusher post connector.
   - Overpressure spring (key 39)
   - Spring holder (key 37)
   - Machine screw (key 38)
10. Insert and tighten the cap screw (key 38) with a torque of 1 to 3 foot-pounds / 1.4 to 4.1 N•m to secure the diaphragm parts to the pusher post (key 8).
11. Install the assembled parts into the lower diaphragm casing assembly (key 4). Make sure that the lever assembly (key 16) fits in the pusher post (key 8) and the holes in the diaphragm (key 10) align with the holes in the diaphragm casing assembly.
12. Install the spring case assembly (key 3) on the lower casing assembly (key 4) so that the vent assembly (key 26) is correctly oriented. Secure the spring case assembly with the cap screws (key 24) and hex nuts (key 23, not shown) fingertight.
13. Insert the spring (key 6) into the spring case assembly (key 3), followed by the adjusting screw (key 35).
14. Turn the adjusting screw (key 35) clockwise until there is enough spring force to provide proper slack to the diaphragm (key 10). Use crisscross pattern to tighten the cap screws (key 24) and hex nuts (key 23, not shown) with 18 to 21 foot-pounds / 24 to 28 N•m of torque.
15. Install a replacement closing cap gasket (key 25) if necessary, and then install the closing cap (key 22).

Type 95H Supply Pressure Regulator

This section includes instructions for disassembly and assembly of replacement parts. All key numbers refer to Figure 9.

WARNING

To avoid personal injury resulting from sudden release of pressure, isolate the regulator from all pressure and cautiously release trapped pressure from the main valve, pilot, or supply regulator before attempting disassembly.

1. Unscrew the valve plug guide (key 5) from the body (key 1). The valve plug spring (key 10) and the valve plug (key 4) will normally come out of the body along with the valve plug guide.
2. Inspect the seating surface of the valve plug, being sure that the composition surface (or polished steel surface) of the valve plug is not damaged. Replace if damaged.
3. Inspect the seating edge of the orifice (key 3). If damaged, unscrew the orifice from the body (key 1) and replace it with a new part. If no further maintenance is required, reassemble the regulator in the reverse of the above steps. When installing the valve plug guide (key 5), coat the threads and sealing surface with sealant to ensure an adequate metal-to-metal seal.
4. To inspect the diaphragm (key 12) or other internal parts, loosen the locknut (key 17) and turn the adjusting screw (key 15) counterclockwise to remove all spring compression.
5. Remove the diaphragm case cap screws (key 16) and lift off the spring case (key 2). Remove the upper spring seat (key 9) and regulator spring (key 11). Remove the lower spring seat (key 8).
6. Remove the diaphragm (key 12) and examine for damage. Replace if damaged.
7. With diaphragm removed, check to be sure the pressure registration hole is completely open and free of all obstructions.
8. Reassemble in reverse order of the previous steps. Lubricate the upper spring seat (key 9) and the exposed threads of the adjusting screw (key 15). Before tightening cap screws (key 16) be sure to install the adjusting screw, if completely removed, and turn it down to obtain diaphragm slack. This allows proper positioning of the diaphragm to permit full travel of the valve plug (key 4). Complete reassembly procedures and temporarily install a gauge in place of the pipe plug (key 52, Figure 10). Turn the adjusting screw to produce the desired outlet pressure values shown in Table 4. Tighten the locknut to maintain the desired setting.

Type 1098 Actuator and Mounting Parts

Perform this procedure if changing, inspecting, or replacing the actuator and/or pilot mounting parts. Key numbers are referenced in Figures 7 and 10.

WARNING

To avoid personal injury resulting from sudden release of pressure, isolate the regulator from all pressure and cautiously release trapped pressure from the unit before attempting disassembly.

1. The actuator and pilot may be removed and replaced as a unit by disconnecting the control line.
2. Access to all internal parts except the stem O-rings (key 6), bearings (key 56), and wiper ring (key 57) may be gained without removing the bonnet (key 3) or upper diaphragm case (key 2) from the main valve. Disconnect the loading tubing (key 24) and the control line connection from the actuator.
3. Remove the cap screws (key 10), hex nuts (key 11), lower diaphragm case (key 1), diaphragm (key 7), and diaphragm plate (key 8). To separate the stem (key 12) from the diaphragm plate, remove the stem cap screw (key 9).
4. **To remove the case O-ring (key 5),** unscrew the four cap screws (key 4), remove the upper diaphragm case (key 2), and remove the case O-ring. **To remove the stem O-rings (key 6), bearings (key 56), and wiper ring (key 57),** remove the loading and control lines. Unscrew the bonnet (key 3), and remove the wiper ring, bearings, and O-rings.
5. Lubricate both stem O-rings (key 6), and wiper ring (key 57). Install them with the stem bearings (key 56) in the bonnet (key 3). Lubricate the case O-ring (key 5), and install it in the bonnet. Line up the holes in the upper diaphragm casing (key 2) and the bonnet; insert and tighten the four cap screws (key 4) to 24 to 30 foot-pounds / 32 to 41 N•m of torque. Thread the bonnet into the main valve body.
6. Secure the diaphragm plate (key 8) to the stem (key 12) with the stem cap screw (key 9). Lay the entire diaphragm (key 7), diaphragm plate, and stem assembly into the lower diaphragm case (key 2) so the diaphragm convolution laps up over the diaphragm plate according to Figure 7. Then install the stem slowly up into the bonnet (key 3) to prevent stem or O-ring damage, and secure the lower diaphragm case to the upper diaphragm case (key 1) with the cap screws (key 10) and nuts (key 11). Tighten the cap screws and nuts to 24 to 30 foot-pounds / 32 to 41 N•m of torque. Tighten evenly in a crisscross pattern to avoid crushing the diaphragm.
7. Grease the stem O-rings (key 6) through the grease fitting (key 28) until excess grease starts coming out the vent assembly (key 27).
8. Install the loading and control line tubing if removed.

Parts Ordering

Each Type 1190 gas blanketing regulator has a serial number stamped on the nameplate. Refer to this number when contacting your local Sales Office or when ordering parts.

When ordering a replacement part, be sure to reference the key number of each needed part and the complete 11-character part number.

Parts List (Figures 6 through 10)

Parts marked NACE can be used for sour gas service as detailed in the NACE International Standard MR0175. Parts referenced in the parts list can be found in Figures 6 through 10.

Type EGR Main Valve (Figure 6)

Key	Description	Part Number
	Parts Kit, Nitrile (NBR) Elastomers (included are keys 4, 7, 12, 15, 17, 21, 36, and 37)	
	NPS 1 / DN 25	R63EGX00112
	NPS 2 / DN 50	R63EGX00122
	NPS 3 / DN 80	R63EGX00132
	NPS 4 / DN 100	R63EGX00142
	NPS 6, 8 x 6, and 12 x 6 / DN 150, 200 x 150, and 300 x 150	R63EGX00162
1	Valve Body	See Table 5
2	Body Flange	
	Cast iron, ENC	
	NPS 2 / DN 50	25A3168X012
	NPS 3 / DN 80	24A9034X012
	NPS 4 / DN 100	25A2309X012
	NPS 6 / DN 150	34A8172X012
	WCC steel, ENC, Heat-treated	
	NPS 1 / DN 25	24A6779X012
	NPS 2 / DN 50	25A2254X012
	NPS 3 / DN 80	25A2300X012
	NPS 4 / DN 100	24A9032X012
	NPS 6 / DN 150	34A7152X012

Table 5. *Type EGR Main Valve Body Part Numbers (key 1)*

BODY MATERIAL	END CONNECTION STYLE	BODY SIZES, NPS / DN					
		1 / 25	2 / 50	3 / 80	4 / 100	6 / 150	8 x 6 / 200 x 150
Cast Iron	NPT	34B7611X012	38A8845X012	----------	----------	----------	----------
	CL125 FF	34B8630X012	38A8847X012	38A8851X012	38A8865X012	38A8875X012	----------
	CL250 RF	37B5950X012	38A8846X012	38A8850X012	38A8854X012	38A7110X012	----------
WCC Steel	NPT	37B5946X012	38A8848X012	----------	----------	----------	----------
	SWE	GE05951X012	GE05958X012	----------	----------	----------	----------
	CL150 RF	37B5947X012	38A8853X012	38A8872X012	38A8867X012	38A7115X012	GE05973X012
	CL300 RF	37B5948X012	38A8849X012	38A8871X012	38A8869X012	38A8873X012	GE05974X012
	CL600 RF	37B5949X012	38A8844X012	38A8852X012	38A8866X012	38A8874X012	GE05975X012
	BWE (SCH 40)	GE05953X012	GE05957X012	GE05962X012	GE05967X012	GE05971X012	----------
	BWE (SCH 80)	GE05954X012	GE05959X012	GE05963X012	GE05968X012	GE05970X012	----------
	PN 16/25/40	GE05956X012	GE05960X012	GE05965X012	GE05969X012	GE05972X012	GE05977X012
WCC Steel (NACE)	NPT	----------	38A8848X022	----------	----------	----------	----------
	CL150 RF	37B5947X022	38A8853X052	38A8872X062	38A8867X032	38A7115X022	GE05973X022
	CL300 RF	37B5948X022	38A8849X022	38A8871X042	38A8869X022	38A8873X022	GE05974X022
	CL600 RF	37B5949X022	38A8844X022	38A8852X032	38A8866X022	38A8874X022	GE05975X022
CF8M Stainless Steel (NACE)	NPT	37B5946X032	38A8848X032	----------	----------	----------	----------
	SWE	GE05951X022	GE05958X022	----------	----------	----------	----------
	CL150 RF	37B5947X032	38A8853X072	38A8872X052	38A8867X042	38A7115X032	----------
	CL300 RF	37B5948X032	38A8849X032	38A8871X052	38A8869X032	38A8873X032	----------
	CL600 RF	37B5949X032	38A8844X032	38A8852X042	38A8866X032	38A8874X032	----------
	BWE (SCH 40)	GE05953X022	GE05957X022	GE05962X022	GE05967X022	GE05971X022	GE05976X022
	BWE (SCH 80)	GE05954X022	GE05959X022	GE05963X022	GE05968X022	GE05970X022	----------
	PN 16/25/40	GE05956X022	GE05960X022	GE05965X022	GE05969X022	GE05972X022	----------

Type EGR Main Valve (Figure 6)

Key	Description	Part Number
2	Body Flange (continued)	
	CF8M stainless steel, ENC, Heat-treated (NACE) (continued)	
	NPS 1 / DN 25	24A6779X062
	NPS 2 / DN 50	25A2254X082
	NPS 3 / DN 80	25A2300X122
	NPS 4 / DN 100	24A9032X042
	NPS 6 / DN 150	34A7152X052
3	Cap Screw, Zinc-plated steel (use with cast iron or steel bodies)	
	NPS 1 / DN 25 (4 required)	1R281124052
	NPS 2 / DN 50 (8 required)	1A453324052
	NPS 3 / DN 80 (8 required)	1A454124052
	NPS 4 / DN 100 (8 required)	1A485724052
	NPS 6 / DN 150 (12 required)	1U513124052
	Stud Bolt, Steel (use with stainless steel bodies)	
	NPS 1 / DN 25 (4 required)	1R284835222
	NPS 2 / DN 50 (8 required)	1K242935222
	NPS 3 / DN 80 (8 required)	1A378135222
	NPS 4 / DN 100 (8 required)	1R369035222
	NPS 6 / DN 150 (12 required)	1A365635222
4*	Gasket, Composition	
	NPS 1 / DN 25	14A6785X012
	NPS 2 / DN 50	14A5685X012
	NPS 3 / DN 80	14A5665X012
	NPS 4 / DN 100	14A5650X012
	NPS 6 / DN 150	14A6984X012

Key	Description	Part Number
5	Lower Indicator Fitting	
	Plated steel	
	NPS 1 / DN 25	T21117T0012
	NPS 1 / DN 25 (NACE)	T21117T0022
	NPS 2, 3, and 4 / DN 50, 80, and 100	T21107T0012
	NPS 6 / DN 150 (NACE)	T21120T0012
	316 Stainless steel	
	NPS 2, 3, and 4 / DN 50, 80, and 100 (NACE)	T21107T0022
6	O-ring Retainer, 416 Stainless steel (NACE)	T14276T0012
7*	Stem O-Ring	
	Nitrile (NBR)	1E472706992
	Fluorocarbon (FKM)	1N430406382
	Kalrez® Perfluoroelastomer (FFKM)	1D6875X0082
	Ethylenepropylene (EPDM)	1D6875X0092
8	Hex Nut, Plated steel	1A662228992
9	Spring	
	Steel	
	60 psi / 4.1 bar maximum drop, Green	
	NPS 1 / DN 25	14A9687X012
	NPS 2 / DN 50	14A6626X012
	NPS 3 / DN 80	14A6629X012
	NPS 4 / DN 100	14A6632X012
	NPS 6 / DN 150	14A9686X012
	125 psi / 8.6 bar maximum drop, Blue	
	NPS 1 / DN 25	14A9680X012
	NPS 2 / DN 50	14A6627X012
	NPS 3 / DN 80	14A6630X012
	NPS 4 / DN 100	14A6633X012
	NPS 6 / DN 150	14A9685X012

*Recommended spare part

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Key	Description	Part Number
9	Spring (continued)	
	400 psi / 27.6 bar maximum drop, Red	
	NPS 1 / DN 25	14A9679X012
	NPS 2 / DN 50	14A6628X012
	NPS 3 / DN 80	14A6631X012
	NPS 4 / DN 100	14A6634X012
	NPS 6 / DN 150	15A2615X012
	Inconel® X750 (NACE)	
	60 psi / 4.1 bar maximum drop, Green	
	NPS 1 / DN 25	11B6769X012
	NPS 2 / DN 50	16A5501X012
	NPS 3 / DN 80	16A5503X012
	NPS 4 / DN 100	16A5506X012
	NPS 6 / DN 150	16A5510X012
	125 psi / 8.6 bar maximum drop, Blue	
	NPS 1 / DN 25	12B8326X012
	NPS 2 / DN 50	16A5995X012
	NPS 3 / DN 80	16A5996X012
	NPS 4 / DN 100	16A5997X012
	NPS 6 / DN 150	16A5999X012
	400 psi / 27.6 bar maximum drop, Red	
	NPS 1 / DN 25	10B1882X012
	NPS 2 / DN 50	16A5499X012
	NPS 3 / DN 80	16A5500X012
	NPS 4 / DN 100	16A5998X012
	NPS 6 / DN 150	16A6000X012
10	Indicator Stem	
	Stainless steel	
	NPS 1 / DN 25	T14311T0012
	NPS 2 / DN 50	T14275T0012
	NPS 3 / DN 80	T14312T0012
	NPS 4 / DN 100	T14313T0012
	NPS 6 / DN 150	T14314T0012
	316 Stainless steel (NACE)	
	NPS 1 / DN 25	T14311T0022
	NPS 2 / DN 50	T14275T0022
	NPS 3 / DN 80	T14312T0022
	NPS 4 / DN 100	T14313T0022
	NPS 6 / DN 150	T14314T0022
11	Cage	
	Linear, CF8M Stainless steel (NACE)	
	NPS 1 / DN 25	34B4136X012
	NPS 2 / DN 50	34B5838X012
	NPS 3 / DN 80	34B5839X012
	NPS 4 / DN 100	34B5840X012
	NPS 6 / DN 150	34B5841X012
	Whisper Trim™ Cage	
	416 Stainless steel	
	NPS 1 / DN 25	24A2043X012
	NPS 2 / DN 50	24A5707X012
	NPS 3 / DN 80	24A5708X012
	NPS 4 / DN 100	24A5709X012
	NPS 6 / DN 150	24A8174X012
	316 Stainless steel (NACE)	
	NPS 1 / DN 25	24A2043X022
	NPS 2 / DN 50	24A5707X022
	NPS 3 / DN 80	24A5708X042
	NPS 4 / DN 100	24A5709X022
	NPS 6 / DN 150	24A8174X022
	316 Stainless Steel, 55% Capacity	
	NPS 2 / DN 50	37B7874X022
	Quick Open	
	Cast Iron	
	NPS 1 / DN 25	37A7211X012
	NPS 2 / DN 50	37A7212X012
	NPS 3 / DN 80	37A7213X012
	NPS 4 / DN 100	37A7214X012
	Steel	
	NPS 6 / DN 150	37A7215X022

Key	Description	Part Number
12*	Port Seal	
	Nitrile (NBR) **(standard)**	
	NPS 1 / DN 25	14A6788X012
	NPS 2 / DN 50	24A5673X012
	NPS 3 / DN 80	24A5658X012
	NPS 4 / DN 100	24A5643X012
	NPS 6 / DN 150	14A8175X012
	Fluorocarbon (FKM)	
	NPS 1 / DN 25	14A8186X012
	NPS 2 / DN 50	25A7412X012
	NPS 3 / DN 80	25A7375X012
	NPS 4 / DN 100	25A7469X012
	NPS 6 / DN 150	14A6996X012
	Kalrez® Perfluoroelastomer (FFKM)	
	NPS 1 / DN 25	14A6788X042
	NPS 2 / DN 50	24A5673X082
	NPS 3 / DN 80	24A5658X052
	NPS 4 / DN 100	24A5643X032
	NPS 6 / DN 150	14A8175X042
	Ethylenepropylene (EPDM)	
	NPS 1 / DN 25	14A6788X022
	NPS 2 / DN 50	24A5673X062
	NPS 3 / DN 80	24A5658X062
	NPS 4 / DN 100	24A5643X052
	NPS 6 / DN 150	14A8175X022
13*	Seat Ring	
	416 Stainless steel	
	NPS 1 / DN 25, 1-5/16-inch / 33 mm orifice	24A6781X012
	NPS 2 / DN 50, 2-3/8-inch / 60 mm orifice	24A5670X012
	NPS 3 / DN 80, 3-3/8-inch / 86 mm orifice	24A5655X012
	NPS 4 / DN 100, 4-3/8-inch / 111 mm orifice	24A5640X012
	NPS 6 / DN 150, 7-3/16-inch / 183 mm orifice	24A6989X012
	NPS 8 x 6 / DN 200 x 150, 7-3/16-inch / 183 mm orifice	38A4216X012
	316 Stainless steel (NACE)	
	NPS 1 / DN 25, 1-5/16-inch / 33 mm orifice	24A6781X022
	NPS 2 / DN 50, 2-3/8-inch / 60 mm orifice	24A5670X022
	NPS 3 / DN 80, 3-3/8-inch / 86 mm orifice	24A5655X022
	NPS 4 / DN 100, 4-3/8-inch / 111 mm orifice	24A5640X022
	NPS 6 / DN 150, 7-3/16-inch / 183 mm orifice	24A6989X022
	NPS 8 x 6 / DN 200 x 150, 7-3/16-inch / 183 mm orifice	38A4216X022
15*	Upper Seal	
	Nitrile (NBR) **(standard)**	
	NPS 1 / DN 25	14A6789X012
	NPS 2 / DN 50	24A5674X012
	NPS 3 / DN 80	24A5659X012
	NPS 4 / DN 100	24A5644X012
	NPS 6 / DN 150	14A8176X012
	Fluorocarbon (FKM)	
	NPS 1 / DN 25	14A8187X012
	NPS 2 / DN 50	25A7413X012
	NPS 3 / DN 80	25A7376X012
	NPS 4 / DN 100	25A7468X012
	NPS 6 / DN 150	14A8185X012
	Kalrez® Perfluoroelastomer (FFKM)	
	NPS 1 / DN 25	14A6789X042
	NPS 2 / DN 50	24A5674X082
	NPS 3 / DN 80	24A5659X052
	NPS 4 / DN 100	24A5644X032
	NPS 6 / DN 150	14A8176X042
	Ethylenepropylene (EPDM)	
	NPS 1 / DN 25	14A6789X022
	NPS 2 / DN 50	24A5674X062
	NPS 3 / DN 80	24A5659X062
	NPS 4 / DN 100	24A5644X052
	NPS 6 / DN 150	14A8176X022
16*	Valve Plug, Heat-treated	
	416 Stainless steel	
	NPS 1 / DN 25	14A6780X012
	NPS 2 / DN 50	24A6772X012
	NPS 3 / DN 80	24A9421X012
	NPS 4 / DN 100	24A8182X012
	NPS 6 / DN 150	24A6992X012

*Recommended spare part

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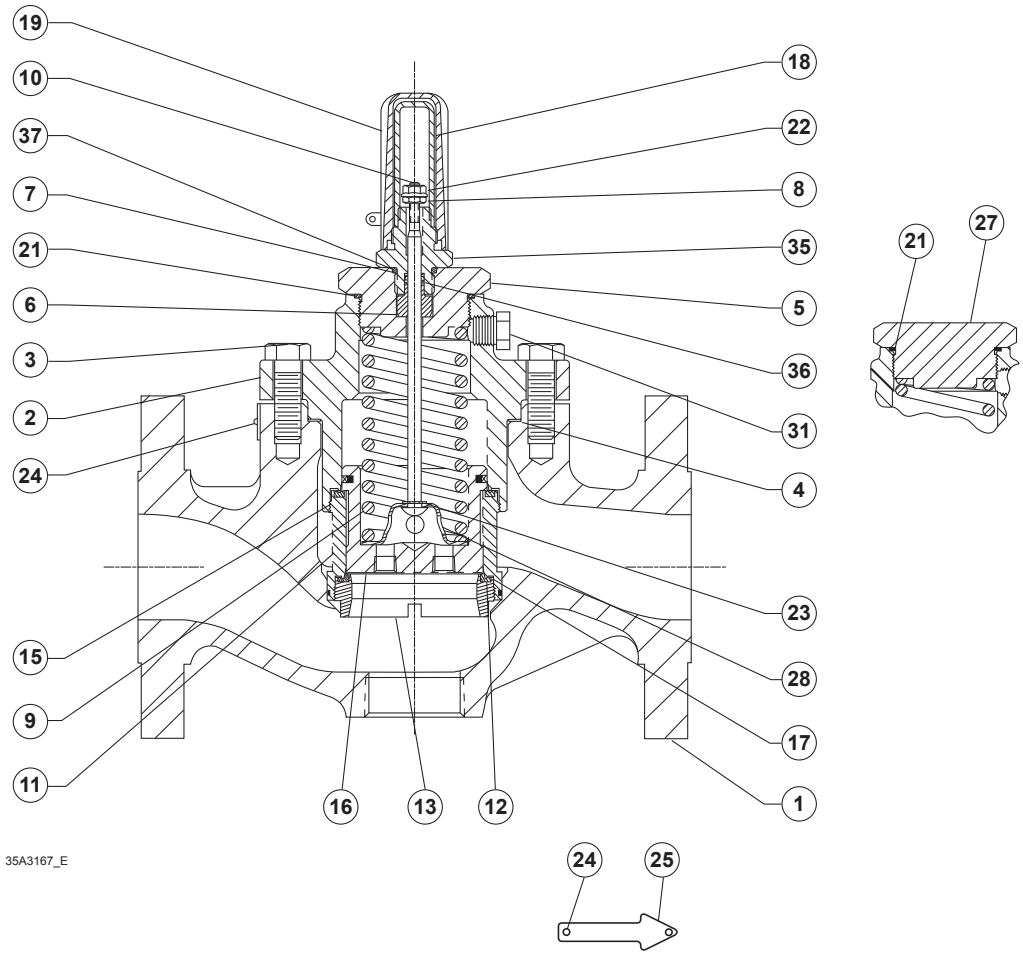

Figure 6. *Type EGR Main Valve*

Key	Description	Part Number
16*	Valve Plug, Heat-treated (continued)	
	316 Stainless steel (NACE)	
	NPS 1 / DN 25	14A6780X022
	NPS 2 / DN 50	24A6772X032
	NPS 3 / DN 80	24A9421X022
	NPS 4 / DN 100	24A8182X022
	NPS 6 / DN 150	24A6992X022
17*	Cage O-Ring	
	Nitrile (NBR) **(standard)**	
	NPS 1 / DN 25	10A7777X012
	NPS 2 / DN 50	10A7779X012
	NPS 3 / DN 80	14A5688X012
	NPS 4 / DN 100	10A3481X012
	NPS 6 / DN 150	18A2556X022
	Fluorocarbon (FKM)	
	NPS 1 / DN 25	10A7778X012
	NPS 2 / DN 50	10A7779X022
	NPS 3 / DN 80	14A5688X022
	NPS 4 / DN 100	10A3483X012
	NPS 6 / DN 150	18A2556X032
	Kalrez® Perfluoroelastomer (FFKM)	
	NPS 1 / DN 25	10A7777X032
	NPS 2 / DN 50	10A7779X132
	NPS 3 / DN 80	14A5688X112
	NPS 4 / DN 100	10A3481X032
	NPS 6 / DN 150	18A2556X062

Key	Description	Part Number
17*	Cage O-Ring (continued)	
	Ethylenepropylene (EPDM)	
	NPS 1 / DN 25	10A7777X022
	NPS 2 / DN 50	10A7779X052
	NPS 3 / DN 80	14A5688X082
	NPS 4 / DN 100	10A3481X052
	NPS 6 / DN 150	18A2556X072
18	Indicator Scale, Plastic	
	NPS 1 / DN 25	14A6759X012
	NPS 2 / DN 50	14A5678X012
	NPS 3 / DN 80	14A5662X012
	NPS 4 / DN 100 with 2-inch / 51 mm travel	14A5647X012
	NPS 4 / DN 100 with 1-1/2-inch / 38 mm travel	14A5662X012
	NPS 6 / DN 150	14A5647X012
19	Indicator Protector, Zinc-plated steel	
	NPS 1 / DN 25	24B1301X012
	NPS 2 / DN 50	24B1301X012
	NPS 3, 4, and 6 / DN 80, 100, and 150	14A6769X012
20	Plug O-Ring	
	Nitrile (NBR) **(standard)**	
	NPS 1 / DN 25	14A6981X012
	NPS 2 / DN 50	14A5686X012
	NPS 3 / DN 80	1V326906562
	NPS 4 / DN 100	14A5688X012
	NPS 6 / DN 150	1K879306992

*Recommended spare part

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Key	Description	Part Number
20	Plug O-Ring (continued)	
	Fluorocarbon (FKM)	
	NPS 1 / DN 25	14A8188X012
	NPS 2 / DN 50	14A5686X022
	NPS 3 / DN 80	1V3269X0042
	NPS 4 / DN 100	14A5688X022
	NPS 6 / DN 150	1V547606382
	Kalrez® Perfluoroelastomer (FFKM)	
	NPS 1 / DN 25	14A6981X072
	NPS 2 / DN 50	14A5686X072
	NPS 3 / DN 80	1V3269X0082
	NPS 4 / DN 100	14A5688X112
	NPS 6 / DN 150	1K8793X0022
	Ethylenepropylene (EPDM)	
	NPS 1 / DN 25	14A6981X032
	NPS 2 / DN 50	14A5686X052
	NPS 3 / DN 80	1V3269X0062
	NPS 4 / DN 100	14A5688X082
	NPS 6 / DN 150	1K8793X0012
21*	Indicator Fitting O-Ring	
	Nitrile (NBR) **(standard)**	
	NPS 1 / DN 25	10A8931X012
	NPS 2, 3, and 4 / DN 50, 80, and 100	10A3800X012
	NPS 6 / DN 150	1F262906992
	Fluorocarbon (FKM)	
	NPS 1 / DN 25	10A0811X012
	NPS 2, 3, and 4 / DN 50, 80, and 100	1R727606382
	NPS 6 / DN 150	1F2629X0012
	Kalrez® Perfluoroelastomer (FFKM)	
	NPS 1 / DN 25	10A8931X032
	NPS 2, 3, and 4 / DN 50, 80, and 100	10A3800X062
	NPS 6 / DN 150	1F2629X0042
	Ethylenepropylene (EPDM)	
	NPS 1 / DN 25	10A8931X022
	NPS 2, 3, and 4 / DN 50, 80, and 100	10A3800X042
	NPS 6 / DN 150	1F2629X0032
22	Flange Nut, Plated steel	14A5693X012
23	E-Ring	
	Stainless steel	14A8181X012
	15-7 Stainless steel, heat treated (NACE)	14A8181X022
24	Drive Screw, Stainless steel (2 required)	1A368228982
25	Flow Arrow, Stainless steel	- - - - - - - - - - -
27	Plug	
	Steel	
	NPS 1 / DN 25	14A6983X012
	NPS 2, 3, and 4 / DN 50, 80, and 100	14A9684X012
	Stainless Steel	
	NPS 1 / DN 25	14A6983X022
	NPS 2, 3, and 4 / DN 50, 80, and 100	14A9684X032
	NPS 6 / DN 150	14A8178X032
28	Spring Seat	
	Full Capacity Trim	
	Zinc-plated steel	
	NPS 1 / DN 25	14A6982X012
	NPS 2, 3, and 4 / DN 50, 80, and 100	15A2206X012
	NPS 6 / DN 150	14A8177X012
	Heat-treated wrought steel (NACE)	
	NPS 1 / DN 25	14A6982X022
	NPS 2, 3, and 4 / DN 50, 80, and 100	15A2206X022
	NPS 6 / DN 150	14A8177X022
	Reduced Capacity Trim	
	416 Stainless steel (NACE)	
	NPS 2, 3, and 4 / DN 50, 80, and 100	14A9678X012
	NPS 6 / DN 150	14A9688X012
29	Hex Nut (with stainless steel body) (not shown)	
	NPS 1 / DN 25 (4 required)	1C330635252
	NPS 2 / DN 50 (8 required)	1A377235252
	NPS 3 / DN 80 (8 required)	1A376035252
	NPS 4 / DN 100 (8 required)	1A352035252
	NPS 6 / DN 150 (12 required)	1A440935252
31	Pipe Plug	
	Zinc-plated steel	1A767524662
	316 Stainless steel (NACE)	1A767535072
32	Travel Stop (not available on NPS 1 / DN 25 body),	
	Zinc-plated steel	
	NPS 2 / DN 50	
	30% Flow Capacity	14A9677X012
	70% Flow Capacity	14A9676X012
	NPS 3 / DN 80, 40% Flow Capacity	14A9671X012
	NPS 4 / DN 100, 40% Flow Capacity	14A9670X012
	NPS 6 / DN 150, 40% Flow Capacity	14A9682X012
33	NACE Tag, Stainless steel (not shown)	- - - - - - - - - - -
34	Tag Wire, Stainless steel (NACE) (not shown)	- - - - - - - - - - -
35	Indicator Fitting	
	416 Stainless steel	T21104T0012
	316 Stainless steel (NACE)	T21104T0022
36	Back-up Ring, Polytetrafluoroethylene (PTFE) (2 required)	1K786806992
37	O-ring	
	Nitrile (NBR)	18B3438X012
	Fluorocarbon (FKM)	1N430306382
	Kalrez® Perfluoroelastomer (FFKM)	1N4303X0032
	Ethylenepropylene (EPDM)	1N4303X0012
38	Pipe Plug	
	Zinc-plated steel	1A767524662
	316 Stainless steel (NACE)	1A767535072

Type 1098 Actuator, Size 40 (Figure 7)

Key	Description	Part Number
	Parts kit (included are keys 5, 6, 7, 56, and 57), Size 40, Nitrile (NBR)	R1098X00402
1	Lower Diaphragm Case	
	Steel	24A7155X012
	Steel (NACE)	24A7155X072
	Stainless steel (NACE)	24A7155X052
2	Upper Diaphragm Case	
	Steel	24A5680X012
	Steel (NACE)	24A5680X062
	Stainless steel (NACE)	24A5680X042
3	Bonnet	
	Steel	33B0301X012
	Stainless steel (NACE)	33B0301X052
4	Cap Screw (4 required)	
	Zinc-plated steel	1D529824052
	B8M Stainless steel (NACE)	1D529838992
5*	Case O-Ring	
	Nitrile (NBR)	1F358106992
	Fluorocarbon (FKM)	1F3581X0022
	Ethylenepropylene (EPDM)	1F3581X0052
6*	Stem O-Ring (2 required)	
	Nitrile (NBR)	1C782206992
	Fluorocarbon (FKM)	1K756106382
	Ethylenepropylene (EPDM)	1C7822X0052
7*	Diaphragm	
	Nitrile (NBR)	27B9744X012
	Fluorocarbon FKM)	27B9744X022
	Ethylenepropylene (EPDM)	27B9744X032
8	Diaphragm Plate	
	Cast iron	14A5682X012
	316 Stainless steel (NACE)	GE08466X012
9	Stem Cap Screw	
	Plated steel	1L545428982
	Stainless steel (NACE)	1L545438992
10	Cap Screw (16 required)	
	Zinc-plated steel	1E760324052
	Stainless steel	1E7603X0072

*Recommended spare part

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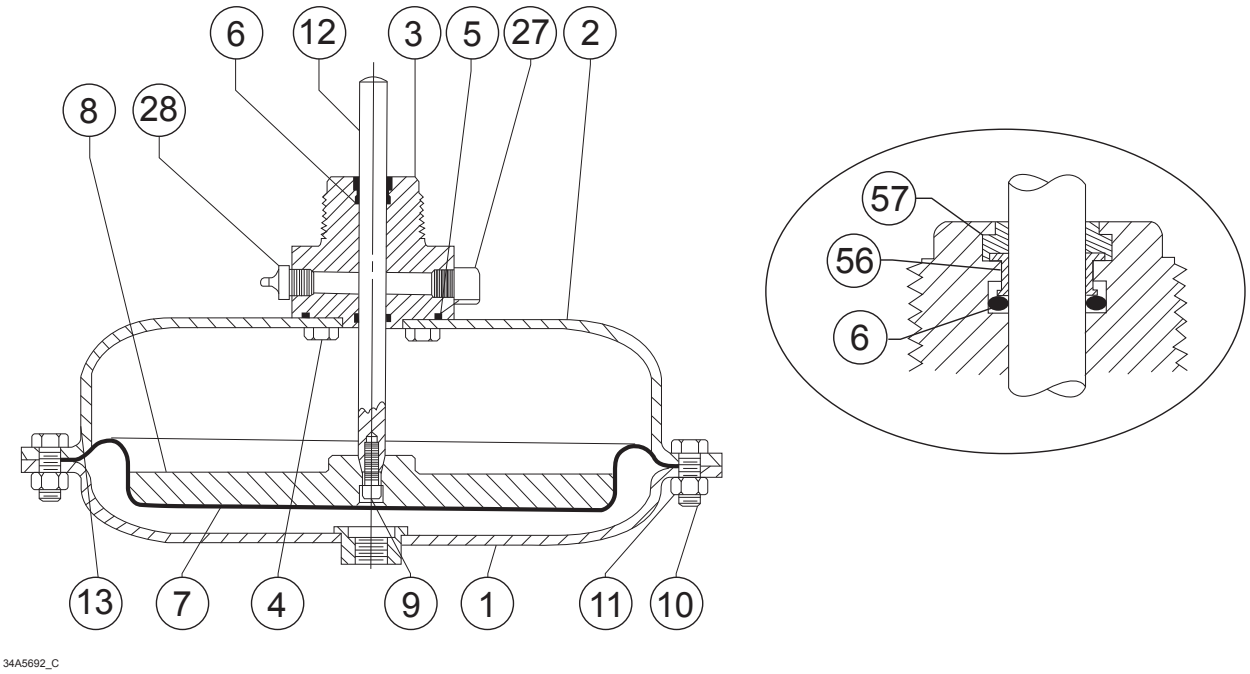


Figure 7. *Type 1098 Actuator*

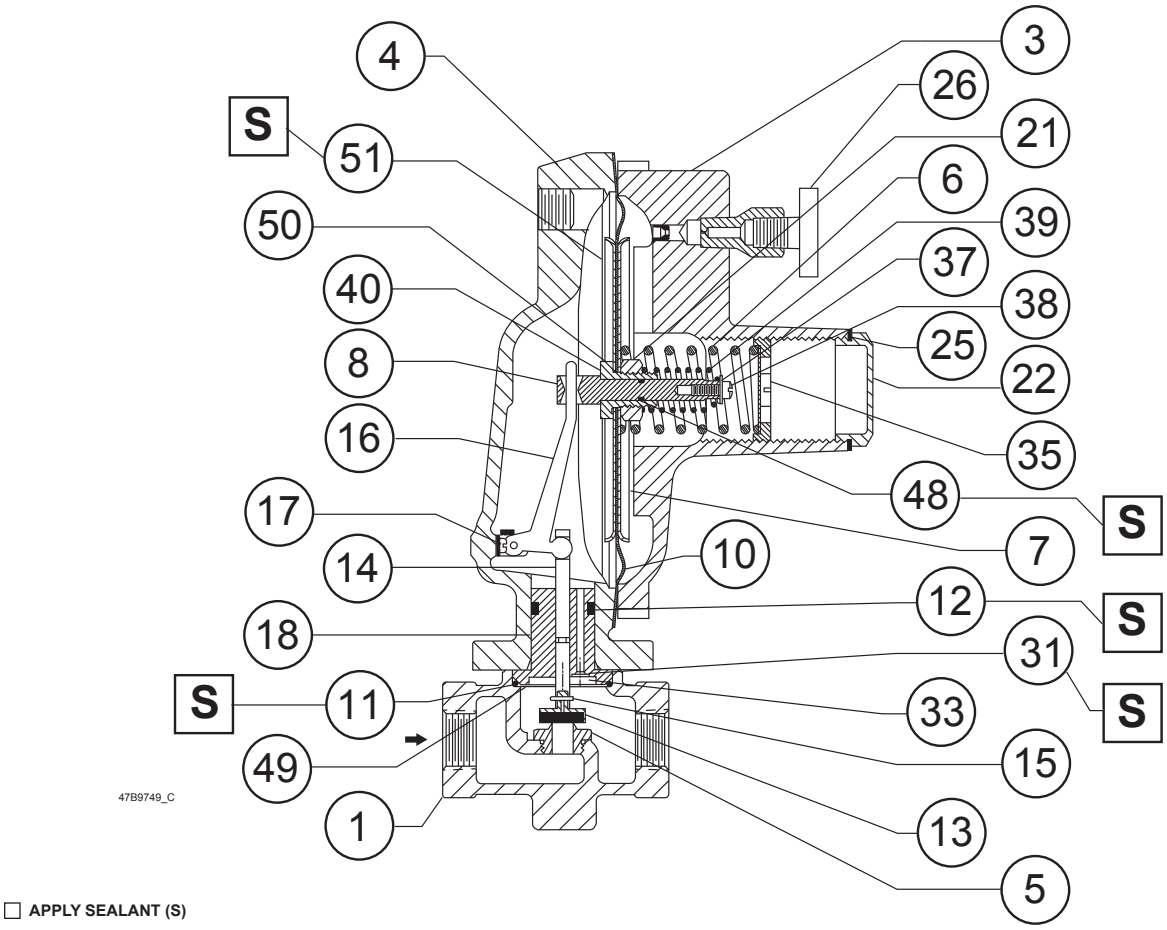
Key	Description	Part Number
11	Hex Nut (16 required)	
	Zinc-plated steel	1A346524122
	18-8 Stainless steel	1A3465X0032
12	Stem	
	17-4PH Stainless steel	
	NPS 1 / DN 25 main valve body	14A6757X012
	NPS 2 / DN 50 main valve body	14A5683X012
	NPS 3 / DN 80 main valve body	14A5663X012
	NPS 4 / DN 100 main valve body	14A5648X012
	NPS 6 / DN 150 main valve body	14A6987X012
	316 Stainless steel (NACE)	
	NPS 1 / DN 25 main valve body	14A6757X022
	NPS 2 / DN 50 main valve body	14A5683X022
	NPS 3 / DN 80 main valve body	14A5663X022
	NPS 4 / DN 100 main valve body	14A5648X022
	NPS 6 / DN 150 main valve body	14A6987X022
	NPS 8 x 6 / DN 200 x 150 main valve body	18A4217X022
13	Nameplate, Stainless steel	- - - - - - - - - -
27	Vent Insert	Type Y602-12
28	Grease Fitting, Steel	1L847828992
54	NACE Tag, 18-8 Stainless steel (not shown)	- - - - - - - - - -
55	NACE Tag Wire, 303 Stainless steel (not shown)	- - - - - - - - - -
56	Bearing (2 required)	
	Nylon (PA)	17A7112X012
	Nyliner	17A7112X022
57	Wiper Ring	15A6002XN12

*Recommended spare part

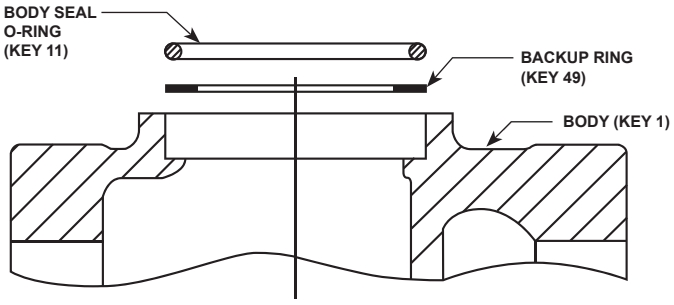
Key	Description	Part Number

Type Y191A Pilot (Figure 8)

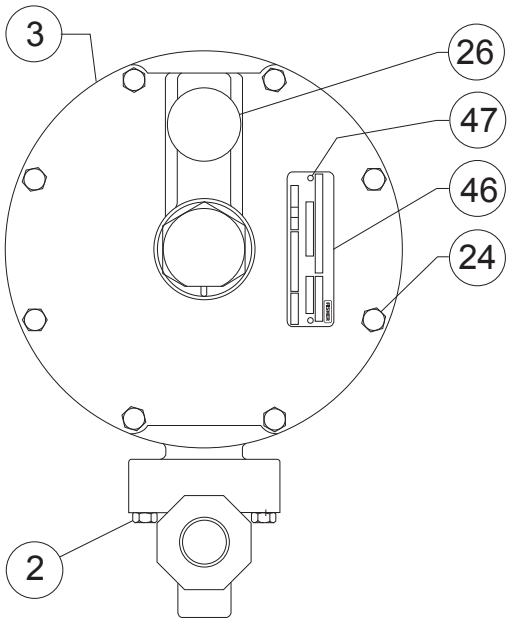
Key	Description	Part Number
	Parts Kit, Nitrile (NBR) (includes keys 10, 11, 12, 13, 15, 25, 31, 33, 45, 48, and 49) for other than sour gas corrosion resistance applications	RY690AX0012
1	Body, 3/4 NPT	
	Ductile iron	17B5351X012
	Stainless steel	17B5351X032
2	Cap Screw (2 required)	
	Ductile iron	1C856228992
	Stainless steel	18B3456X012
3	Spring Case Assembly	
	Ductile iron	13B0109X042
	Stainless steel	13B0109X032
4	Lower Diaphragm Casing	
	Ductile iron	47B3063X012
	Stainless steel	47B3064X012
5	Orifice	
	303 Stainless steel	0B042035032
	316 Stainless steel (NACE)	0B0420X0012
6	Spring, see Table 1 for more information	
	0.25 to 2.5 inches w.c. / 0.6 to 6 mbar, Orange	1B558527052
	2 to 7 inches w.c. / 5 to 17 mbar, Red	1B653827052
	5 to 16 inches w.c. / 12 to 40 mbar, Unpainted	1B653927022
	0.5 to 1.2 psig / 0.03 to 0.08 bar, Yellow	1B537027052
	1.1 to 2.5 psig / 0.07 to 0.17 bar, Green	1B537127022
	2.5 to 4.5 psig / 0.17 to 0.31 bar, Light Blue	1B537227022
	4.5 to 7.0 psig / 0.31 to 0.48 bar, Black	1B537327052



TYPE Y191A PILOT INTERIOR ASSEMBLY



EXPANDED VIEW OF THE BODY AREA SHOWING
THE O-RING AND BACKUP RING PLACEMENT



TYPE Y191A PILOT EXTERIOR ASSEMBLY

Figure 8. *Type Y191A Pilot*

Key	Description	Part Number
7	Diaphragm Head, 304 Stainless steel	17B9723X032
8	Pusher Post	
	303 Stainless steel	27B5354X012
	316 Stainless steel (NACE)	27B5354X022
10*	Diaphragm	
	Nitrile (NBR)	37B9720X012
	Fluorocarbon (FKM)	23B0101X052
	Nitrile (NBR) with PTFE diaphragm protector	34B4375X012
11*	Body Seal O-Ring	
	Nitrile (NBR)	1H993806992
	Fluorocarbon (FKM)	1H9938X0012
	Perfluoroelastomer (FFKM)	1H9938X0042
	Ethylenepropylene (EPDM)	1H9938X0022
12*	Insert Seal	
	Nitrile (NBR)	1B885506992
	Fluorocarbon (FKM)	1B8855X0012
	Perfluoroelastomer (FFKM)	1B8855X0062
	Ethylenepropylene (EPDM)	1B8855X0022
13*	Disk Assembly	
	303 Stainless steel disk holder	
	with Nitrile (NBR) disk	1C4248X0202
	with Fluorocarbon (FKM) disk	1C4248X0052
	with Ethylenepropylene (EPDM) disk	1C4248X0302
	316 Stainless steel disk holder (NACE)	
	with Nitrile (NBR) disk	1C4248X0252
	with Fluorocarbon (FKM) disk	1C4248X0192
	with Perfluoroelastomer (FFKM) disk	1C4248X0332
	with Ethylenepropylene (EPDM) disk	1C4248X0152
14	Stem, Stainless steel (NACE)	17B3423X022
15	Cotter Pin, 302 Stainless steel	1A866537022
16	Lever Assembly, 302 Stainless steel	1B5375000B2
17	Machine Screw (2 required), 18-8 Stainless steel	19A7151X022
18	Guide Insert, 316 Stainless steel	27B4028X022
21	Hex Nut, Zinc-plated steel	1A354024122
22	Closing Cap	
	Plastic **(standard)**	T11069X0012
	Steel	1E422724092
	Stainless steel	1E422735072
23	Hex Nut (not shown) (8 required)	
	Ductile iron	1A352724122
	Stainless steel	1E9440X0352
24	Cap Screw (8 required)	
	Ductile iron	1A352524052
	Stainless steel	18B3455X012
25	Closing Cap Gasket	1P753306992
26	Vent Assembly	Type Y602-1
31*	Throat Seal O-ring	
	Nitrile (NBR)	1D682506992
	Fluorocarbon (FKM)	1D6825X0012
	Perfluoroelastomer (FFKM)	1D6825X0032
	Ethylenepropylene (EPDM)	1D6825X0042
33	Machine Screw, Stainless steel	18A0703X022
35	Adjusting Screw, Zinc die casting	1B537944012
37	Spring Holder, Zinc-plated steel	1R982025072
38	Machine Screw, Stainless steel	10B6189X022
39	Overpressure Spring, Stainless steel	1B541327022
40	Pusher Post Connector	
	303 Stainless steel	27B7982X012
	316 Stainless steel (NACE)	27B7982X022
46	Nameplate	- - - - - - - - - -
47	Drive Screw (2 required), Stainless steel	1A368228982
48	Post Seal	
	Nitrile (NBR)	1D687506992
	Fluorocarbon (FKM)	1N430406382
	Perfluoroelastomer (FFKM)	1D6875X0082
	Ethylenepropylene (EPDM)	1D6875X0032
49	Backup Ring, 302 Stainless steel	18B3446X012
50	Connector Seal O-Ring	
	Nitrile (NBR)	13A1584X012
	Fluorocarbon (FKM)	13A1584X022
	Perfluoroelastomer (FFKM)	13A1584X032
	Ethylenepropylene (EPDM)	13A1584X042
51	Lower Diaphragm Head Assembly, Stainless steel	18B3464X012

*Recommended spare part

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Type 95H Regulator (Figure 9)

Key	Description	Part Number
	Parts Kit (Included are keys 3, 4, 10, and 12) for composition, Trim 3A, 1/4 NPT body	R95HX000102
1	Body, 1/4 NPT	
	Cast iron	1E391019012
	Steel	1J127322012
	Stainless steel	1J127333092
2	Spring Case	
	Cast iron	2E391219012
	Steel	2J127522012
	Stainless steel	2J1275X0012
3*	Orifice	
	416 Stainless steel	1E393235132
	316 Stainless steel (NACE)	1E393235072
4*	Valve Plug	
	416 Stainless steel	
	Neoprene (CR)	1E3933000E2
	Fluorocarbon (FKM)	1E3933X0102
	316 stainless steel	
	Neoprene (CR) (NACE)	1E3933X0012
5	Valve Plug Guide	
	416 Stainless steel	1E391835132
	316 Stainless steel (NACE)	1E391835072
6	Stem Assembly	
	416 Stainless steel	1F2113000A2
	316 Stainless steel (NACE)	1F2113000C2
7*	Stem Guide Bushing	
	416 Stainless steel	1E392235132
	316 Stainless steel (NACE)	1E392235072
8	Lower Spring Seat	
	Aluminum **(standard)**	1E392309012
	303 Stainless steel (NACE)	1E392335022 9
	Upper Spring Seat	
	Steel	1B798525062
	302 Stainless steel (NACE)	1B798535022
9	Upper Spring Seat	
	Steel	1B798525062
	302 Stainless steel (NACE)	1B798535022
10	Valve Plug Spring	
	302 Stainless steel	1E392437022
	Inconel® X750 (NACE)	19A2862X012

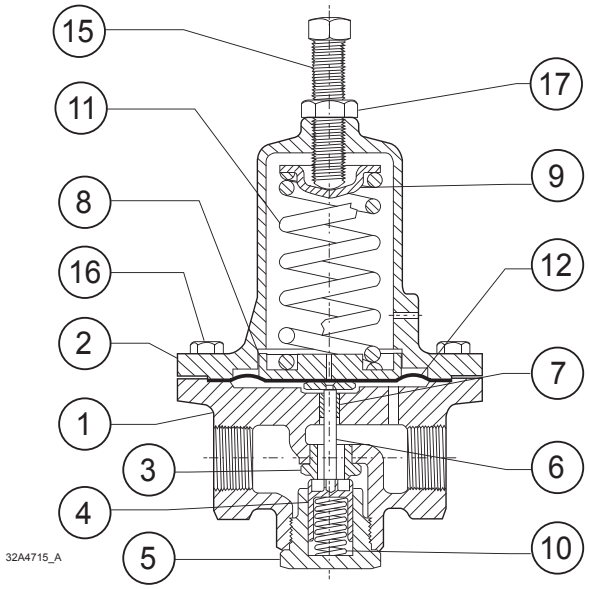

Figure 9. *Type 95H Supply Pressure Regulator*

Key	Description	Part Number
11	Spring	
	5 to 30 psig / 0.34 to 2.1 bar, Yellow	1E392527022
12*	Diaphragm	
	Neoprene (CR)	1E393502112
	Fluorocarbon (FKM)	1E393502402
13	Nameplate	- - - - - - - - - -
15	Adjusting Screw, Steel	1E639928992
16	Cap Screw (6 required)	
	Steel	1A407824052
	Steel (NACE)	1A391724052
17	Locknut, Steel	1A352224122
18	Drive Screw, Stainless steel (2 required)	1A368228982
56	Nace Tag, Stainless steel	- - - - - - - - - -
57	Tag Wire, Stainless steel	- - - - - - - - - -

Mounting Parts (Figure 10)

Key	Description	Part Number
16	Pipe Tee	
	Zinc-plated steel	- - - - - - - - - -
	Stainless steel (NACE)	- - - - - - - - - -
22	Tubing Elbow	
	Plated steel	- - - - - - - - - -
	Stainless steel (NACE)	- - - - - - - - - -
24	Tubing	
	Steel	- - - - - - - - - -
	Stainless steel (NACE)	- - - - - - - - - -
30	Mounting Bracket, Steel	- - - - - - - - - -
31	Cap Screw, Zinc-plated steel (2 required)	- - - - - - - - - -
32	Cap Screw, Zinc-plated steel (2 required)	- - - - - - - - - -
35	Tubing Connector (4 required)	
	Plated steel	- - - - - - - - - -
	Stainless steel (NACE)	- - - - - - - - - -
36	Pipe Bushing (3 required)	
	Steel	- - - - - - - - - -
	Stainless steel	- - - - - - - - - -
	Stainless steel (NACE)	- - - - - - - - - -
38	Pipe Nipple	
	Zinc-plated steel (NACE)	- - - - - - - - - -
	316 Stainless steel	- - - - - - - - - -
39	Pipe Nipple (3 required)	
	Zinc-plated steel (NACE)	- - - - - - - - - -
	316 Stainless steel	- - - - - - - - - -
43	Pipe Bushing (2 required)	
	Steel (NACE)	- - - - - - - - - -
	316 Stainless steel	- - - - - - - - - -
44	Pipe Bushing	
	Steel (NACE)	- - - - - - - - - -
	316 Stainless steel	- - - - - - - - - -
50	Pipe Cross	
	Zinc-plated steel	- - - - - - - - - -
	316 Stainless steel (NACE)	- - - - - - - - - -
51	Bleed Orifice 316 Stainless steel	- - - - - - - - - -
52	Pipe Plug (2 required)	
	Steel	- - - - - - - - - -
	316 Stainless steel (NACE)	- - - - - - - - - -
53	Pipe Tee	
	Zinc-plated steel (NACE)	- - - - - - - - - -
	316 Stainless steel	- - - - - - - - - -

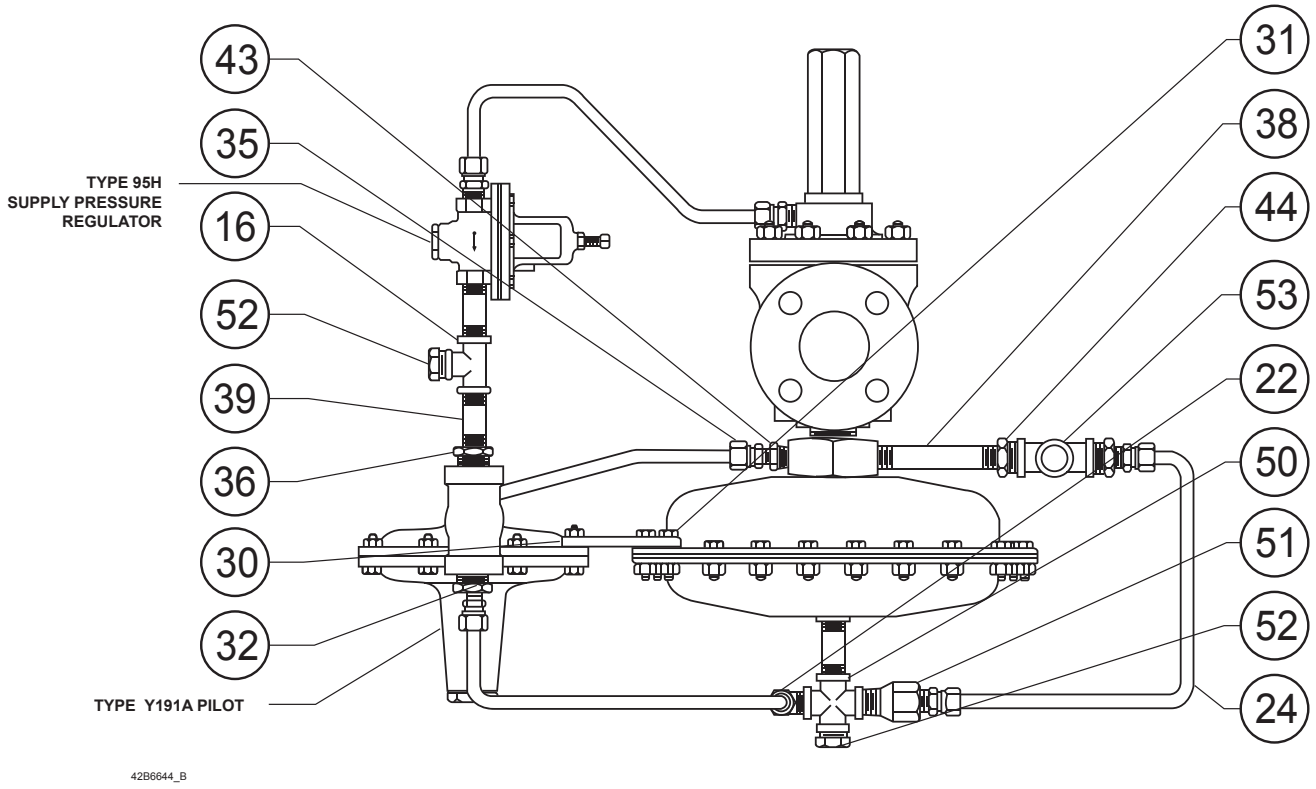

Figure 10. *Type 1190 Mounting Parts*

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